

# PATENT COOPERATION TREATY

HS/EWP

From the INTERNATIONAL SEARCHING AUTHORITY

## PCT

To:  
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OTHER FEES DUE

INVITATION TO PAY ADDITIONAL FEES

(PCT Article 17(3)(a) and Rule 40.1)

Date of Mailing (day/month/year) **OCT 27 2004**

Applicant's or agent's file reference

PAYMENT DUE

within 15 days 11/10  
from the above date of mailing

904.0102.U1(

International application No.

International filing date (day/month/year) 27 June 2003 (27.06.2003)

PCT/US03/20237

Applicant

BROWN UNIVERSITY RESEARCH FOUNDATION

RECEIVED

OCT 30 2004

1. This International Searching Authority **HARRINGTON & SMITH, LLP**
- (i) considers that there are 14 (number of) inventions claimed in the international application covered by the claims indicated below/on an extra sheet:
- Please See Continuation Sheet

and it considers that the international application does not comply with the requirements of unity of invention (Rules 13.1, 13.2 and 13.3) for the reasons indicated below/on an extra sheet:

Please See Continuation Sheet

- (ii) ☐ has carried out a partial international search (see Annex) ☒ will establish the international search report on those parts of the international application which relate to the invention first mentioned in claims Nos.: 1-8,16-19 and

- (iii) will establish the international search report on the other parts of the international application only if, and to the extent to which, additional fees are paid.

2. The applicant is hereby invited, within the time limit indicated above, to pay the amount indicated below:

\$210.00 X 13 = \$2,730.00  
Fee additional per invention number of additional inventions total amount of additional fees

The applicant is informed that, according to Rule 40.2(c), the payment of any additional fee may be made under protest, i.e., a reasoned statement to the effect that the international application complies with the requirement of unity of invention or that the amount of the required additional fee is excessive.

3. ☐ Claim(s) Nos. \_\_\_\_\_ have been found to be unsearchable under Article 17(2)(b) because of defects under Article 17(2)(a) and therefore have not been included with any invention.

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International Application No.  
PCT/US03/20237

This International Search Authority has found 14 inventions claimed in the International Application covered by the claims indicated below:

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1-8, 16-19, 30, drawn to an optical device comprising waveguides and supergratings.

Group II, claim(s) 9-10, drawn to an NxM system for switching optical signals.

Group III, claim(s) 11-15, drawn to a device for physically separating wavelength channels.

Group IV, claim(s) 20, drawn to a device for monitoring magnitude of radiation.

Group V, claim(s) 21-22, drawn to a device for changing optical signal power by power removal.

Group VI, claim(s) 23-24, drawn to an array of waveguide arranged in a grid.

Group VII, claim(s) 25-29, drawn to a device for imposing wavelength dependent delay.

Group VIII, claim(s) 31-35, drawn to a laser comprising a gain medium.

Group IX, claim(s) 36-37, drawn to a device for combining signals.

Group X, claim(s) 38-43, drawn to a device with asymmetric optical means.

Group XI, claim(s) 44-45, drawn to a device with lateral pixels.

Group XII, claim(s) 46, drawn to a three dimensional optical device with 2 dimensional supergrating.

Group XIII, claim(s) 47-61, drawn to a method of forming a supergrating.

Group XIV, claim(s) 62, drawn to a method of forming a supergrating using a filter function.

1. This International Searching Authority considers that the international application does not comply with the requirements of unity of invention (Rules 13.1, 13.2 and 13.3) for the reasons indicated below:

The inventions listed as Groups I- XIV do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

The special technical feature of group I is the claimed arrangement of waveguide structures and the grating structures, including a supergrating structure.

The special technical feature of group II is the switching arrangement using a first row of N/2 input couplers and a final row of M/2 couplers.

The special technical feature of group III is the structure for physically separating optical signal channels using a set of supergrating structure.

The special technical feature of group IV is the structure for monitoring transmitted optical signals.

The special technical feature of group V is the structure for removing power from the transmitted optical signals.

The special technical feature of group VI is the arrangement of waveguide array and a series of wavelength dependent supergratings.

The special technical feature of group VII is the structure for imposing wavelength dependent group delay to the transmitted optical signal.

The special technical feature of group VIII is the lasing structure having a resonance cavity with supergrating structures.

The special technical feature of group IX is the structure for combining optical signals.

The special technical feature of group X is the asymmetric optical means having different attenuation in opposite directions.

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The special technical feature of group XI is the lateral pixels that represent analog profile that forms a design set of wave fronts.

The special technical feature of group XII is the three-dimensional optical device having quantized pixels formed in certain locations.

The special technical feature of group XIII is the method of forming a supergrating.

The special technical feature of group XIV is the method of forming a supergrating using a particular filter function.

Since the special technical feature of each group is exclusive of the special technical feature of other groups, unity of invention is lacking.